

Analysis of Effects-Based Operations – The Road Ahead to Doing Business Differently

Lieutenant Colonel Ted T. Uchida

AF/XOCW

1911 N. Ft Myer Drive, Suite 1200

Arlington, Virginia 22209

USA

[1] 703-588-2717

ted.uchida@pentagon.af.mil

ABSTRACT

Currently, a significant amount of discussion in the United States Air Force centers on Effects-Based Operations (EBO) as the new way to fight. This debate ranges from Military Operations Research Society (MORS) workshops sponsored by senior civilian and military leaders to articles and booklets written by USAF general officers. This paper will provide a definition and brief discussion of EBO before focusing on its main area – EBO in Wargaming, Experimentation, and Exercises. The EBO in Wargaming, Experimentation, and Exercises section of the paper will address EBO as a concept and process and finally a concept of operations (CONOPS). In addition, it will explore an experimentation strategy for determining the “good” and “bad” aspects of EBO and how to logically progress from Wargames through Experiments to Exercises. In an effort to map the road ahead for analysis of EBO, the paper will address four questions:

- 1) How are Effects-Based Operations currently analyzed and/or characterized in wargames, experiments, and exercises?*
- 2) What are the indicators of success for Effects-Based Operations in wargames, experiments, and exercises?*
- 3) What tools and techniques are available to analyze and measure the indicators of success and do any shortfalls exist in this set of tools and techniques?*
- 4) What can be done to improve the analysis of Effects-Based Operations?*

The paper will conclude by highlighting on-going efforts to incorporate and implement Effects-Based Operations in future wargames, experiments, and exercises and potential impacts on doctrine, organization, training, and leadership.

Key Words: *EBO, Effects-Based Operations, Effects, Analysis, Wargames.*

1.0 INTRODUCTION

Purportedly, Albert Einstein had a sign hanging in his office at Princeton that read, “Not everything that counts can be counted, and not everything that can be counted counts.” Whether the sign existed or is more of the folklore surrounding Einstein is unimportant because the sentiment is what is germane.

Paper presented at the RTO SAS Symposium on “Analysis of the Military Effectiveness of Future C2 Concepts and Systems”, held at NC3A, The Hague, The Netherlands, 23-25 April 2002, and published in RTO-MP-117.

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 00 DEC 2003	2. REPORT TYPE N/A	3. DATES COVERED -	
4. TITLE AND SUBTITLE Analysis of Effects-Based Operations The Road Ahead to Doing Business Differently		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AF/XOCW 1911 N. Ft Myer Drive, Suite 1200 Arlington, Virginia 22209 USA		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited			
13. SUPPLEMENTARY NOTES See also ADM001657., The original document contains color images.			
14. ABSTRACT			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	UU
			18. NUMBER OF PAGES 29
			19a. NAME OF RESPONSIBLE PERSON

Reduced to its simplest form, the quote draws a clear distinction between quantitative and qualitative approaches, considerations, and analysis, and concisely makes the point that quantitative efforts alone are insufficient. This distinction and assertion will be especially important and appropriate as we explore the analysis of Effects-Based Operations and, in particular, EBO in wargaming, experimentation, and exercises.

2.0 DEFINITION

Before progressing any further in our discussion, it is important to establish a working definition of Effects-Based Operations. There appears to be myriad definitions for EBO. For instance, in a recent Military Operations Research Society workshop [1], Dr. Paul K. Davis defined EBO as: “Operations conceived and planned in a systems framework that considers the full range of direct, indirect, and cascading effects that may – with different degrees of probability – be achieved by the application of all national instruments: military, diplomatic, economical, and psychological” [2]. Similarly, in their “Analyzing Effects-Based Operations Terms of Reference, MORS put EBO in the context of “A strategic and operational framework for planning, executing, and assessing military operations designed to produce distinctive and desired effects that, in conjunction with other elements of national power such as economic and political actions, compel positive political outcomes. The adaptive application of military, and other capabilities to realize specific, desired operational and strategic outcomes in peace and war in the face of friction, ambiguity, uncertainty, and adaptive adversaries” [3]. The Air Force, in an August 2001 White Paper, defined EBO “as a methodology for planning, executing, and assessing operations designed to attain the effects required to achieve desired national security outcomes” [4]. The final definition we will consider comes from US Joint Forces Command (USJFCOM) J9. In their October 2001 White Paper, the J9 Concepts Department defined EBO as, “a process for obtaining a desired strategic outcome or ‘effect’ on the enemy through the synergistic and cumulative application of the full range of military and non-military capabilities at all levels of conflict” [5], and further defined an effect as “the physical, functional, or psychological outcome, event or consequence that results from specific military or non-military actions” [6].

All of the aforementioned definitions have several concepts or themes in common. They all consider EBO a system or process that can use military and non-military means or actions to produce synergistic and cumulative effects to influence behavior. Because of these similarities and because we’re operating from the orientation of a military organization that very seldom, if ever, acts unilaterally, we will use the USJFCOM definition as our frame of reference and working definition.

3.0 EBO DISCUSSION

As we saw in our discussion of definitions, EBO is variously seen as a system, a methodology, or a process, and this is the best way to think of EBO. It is not a single event, action, or decision point but, rather, a continuous five-stage process, as depicted in Figure 1 [7]. The five stages of the EBO process (Knowledge, Effects, Application, Assessment, and Adaption) fill the inner ellipse in Figure 1 while the arrows in the outer ellipse portray the continuous nature of the EBO process. Arranged around the outer ellipse are the main actions associated with each stage. The process begins with the knowledge stage where one develops comprehensive insight into the adversary or potential adversaries, the environment, and ourselves. In the planning stage one engages in deliberate or contingency planning to achieve the desired effects or outcomes. Once planning is complete, the plan is executed while considering the full range of national capabilities and functions. The assessment phase is where results, in terms of effects and the impact of those effects, are collected, analyzed, and evaluated. This, in turn, leads to the adaptation stage where adjustments or adaptations to the current course of action are made based on effects assessment – all of which are then incorporated into the knowledge stage to continue the process.

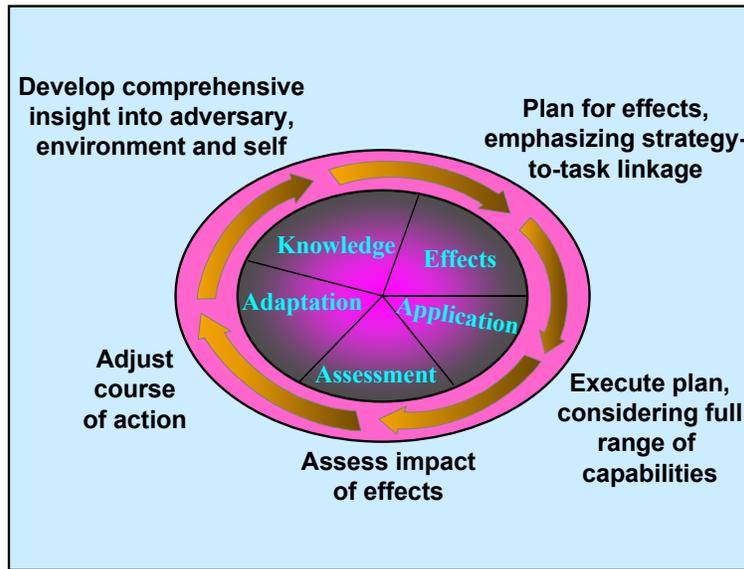


Figure 1: EBO as a Process.

The EBO process is not a new way to fight wars or engage enemies or adversaries, nor is it a replacement for any of the currently recognized or anticipated forms of warfare. As a methodology or process, EBO is a way of thinking and systematically planning, executing, and assessing operations designed to attain specific effects [8] with one of its key strengths being adaptability and incorporation of new concepts and capabilities (Figure 2) [9]. Because one is using a methodology focused on effects rather than means, incorporating new concepts and capabilities is much easier – achieving the desired effect is the focus, not the means.

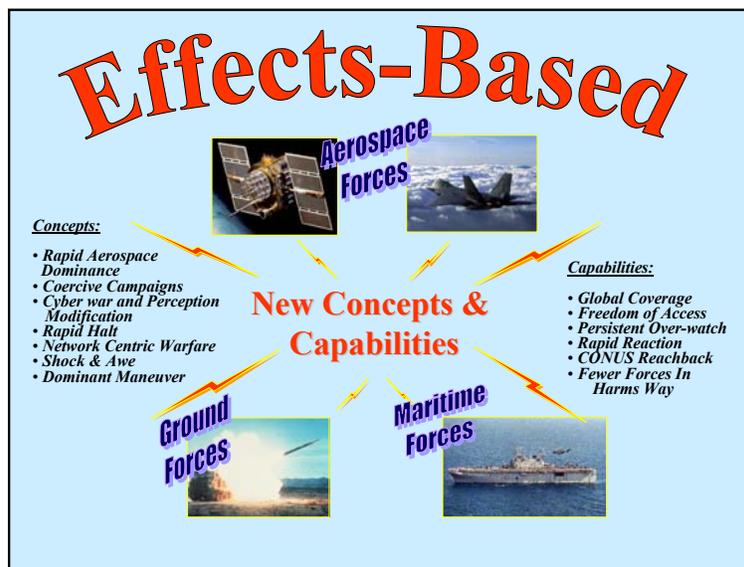


Figure 2: EBO Strength of Incorporating New Concepts and Capabilities.

The second key strength of EBO as a methodology is it improves our ability to use all elements of national power to achieve national policy goals (Figure 3) [10]. Inherent in this strength and coupled with the previously discussed strength is the capability to incorporate tools and elements of national power previously not considered or used. Figure 3 explicitly depicts the Diplomatic, Information, Military, and Economic (DIME) tools while implicitly showing the capability to incorporate other tools by means of the question marks. To take full advantage of the strengths of the EBO methodology, decision-makers must have a clear idea of what it is they are trying to accomplish, what actions might be taken and how the proposed actions will contribute to the desired effect [11].



Figure 3: Integration of Tools and Elements.

This discussion was intended to serve as an introduction to the concept of EBO and a brief introduction of EBO as a process and methodology. It should not be considered in-depth, complete, nor exhaustive, but sufficient for understanding what follows.

4.0 EBO IN WARGAMING, EXPERIMENTATION, AND EXERCISES

Now that we have an EBO frame of reference, working definition, and cursory understanding of the concept, it is time to focus on our main area of concern – wargaming, experimentation, and exercises.

For the purposes of our discussion, a wargame is “a simulation, by whatever means, of a military operation involving two or more opposing forces using rules, data, and procedures designed to depict an actual or real life situation” [12]. An experiment is “an operation carried out under controlled conditions in order to discover an unknown effect or law, to test or establish a hypothesis, or to illustrate a known law” [13]. Finally, an exercise is “a military maneuver or simulated wartime operation involving planning, preparation, and execution. It is carried out for the purpose of training and evaluation. It may be a multination, joint, or single-Service exercise depending on participating organizations” [14].

Before we put these definitions to use, however, let’s turn our attention to the state of development of EBO.

4.1 EBO as a Concept, Process and Concept of Operations

As noted earlier, EBO as a concept is fairly well understood, discussed, and promulgated, especially throughout the doctrine and analysis communities. Writings by Maj Gen David A. Deptula, Air Combat Command Directorate of Plans and Programs (ACC/XP) and Dr. Paul K. Davis (RAND) have contributed significantly to the understanding of the concept of EBO. However, this is not to propose that a universal common understanding of EBO exists. EBO as a concept, means different things to different people depending on orientation, frame of reference, and intended use. This is one of the strengths of EBO as well as a potential weakness.

Likewise, EBO as a process is developing fairly rapidly and becoming better understood. Writings such as the USJFCOM White Paper, USAF White Paper, and efforts by proponents such as Maj Gen Deptula, Dr. Maris McCrabb (Air Force Research Laboratory) and Mr. Graham Kessler, Joint Forces Command Joint Experimentation (JFCOM J9) have furthered the understanding of EBO as a process. Continued effort is required in the EBO as a process area in order to move to the next level where EBO is an understood and implemented concept of operations with the required tactics, techniques, and procedures for use throughout the community.

EBO as a CONOPS is presently in the beginning stages of development. The JFCOM Joint Experimentation Directorate, which integrates experimentation efforts of all the services and unified commands, has taken the first joint steps toward making EBO a fully developed CONOPS by writing Effects-Based Planning Tactics, Techniques, and Procedures (Final Draft) and Effects Assessment: Joint Tactics, Techniques, and Procedures (Draft). These seminal works have been developed by J9 to facilitate incorporating EBO into Millenium Challenge 02 for experimentation.

As previously stated, we are in the early stages of EBO CONOPS development with much work still ahead for the joint community and individual services. As Maj Gen Deptula said in an Air Force Times article, “Effects-based targeting and operations still have a way to go before they become a standard Air Force practice” [15].

4.2 Experimentation Strategy

EBO has far reaching implications across the range of military operations throughout each service and in joint and coalition operations. As such, there is the potential for experimentation in a variety of venues at every level of operations. Leveraging experimentation events in currently established venues offers lucrative opportunities for understanding and developing EBO as a concept and a process as well as developing the CONOPS [16]. Concept and process experimentation could greatly expand the understanding of EBO. Efforts in interagency relationships, Operational Net Assessment, Effects-to-Task Matrix, Effects Tasking Orders, and alternative headquarters organization structures should be the focus while conducting effects-based processes in the planning, execution, assessment, and adaptation cycle. Limited objective experiments (LOEs) in these areas would increase the understanding of effects related processes.

To provide a common basis of understanding for many of these efforts, initial EBO experimentation should follow a seminar-workshop-wargame/limited objective experimentation sequence. Initially, more can be learned about EBO with narrowly focused events vice events that try to look at the entire cycle of conducting operations that are effects-based. The focus of these events must be scoped down to look at individual areas such as interagency relationships, understanding the adversary, developing effects related Courses of Action (COAs), and assessing actions with an effects-based focus. These activities will provide the venue to further

define EBO with insights into potential spiral development of tactics, techniques, and procedures [17]. The organization structures and planning, execution, and assessment processes that emerge from experimentation will help define how EBO will fit into service doctrine and the joint task force of the future [18].

4.3 Progress from Wargames through Experiments to Exercises

Now it is time to use our previously established definitions of wargame, experiment, and exercise. Wargames, while normally depicting actual, projected, or assumed situation, traditionally deal with future concepts and capabilities, i.e., the fuzzy stuff of the future. This is where the concept of EBO would first be manifest in the wargame – experiment – exercise triad.

As the EBO concept is refined and developed into a process, it will move into the experimentation phase. In this phase, joint and service experiments would be used to examine, test, and refine pieces of the EBO process. The goal of experimentation is to examine and test increasingly more pieces of the process until the whole process has been tested. Successful experimentation should result in a CONOPS and associated tactics, techniques, and procedures, which can be promulgated to users in the field by incorporation into doctrine and inclusion in exercises.

To be successful in exercises, EBO must be an integral part of the entire process – planning, executing, and assessing and not an after thought or adjunct. Exercises are designed and conducted to train and evaluate, so we need to fully incorporate EBO as a methodology if we want to maximize our exposure to EBO and our training effectiveness. Familiarity removes fear so the more familiar people are with EBO, the more they will use it.

The key to implementing EBO is to ensure there is a concept, a process, and, eventually, a CONOPS with the required tactics, techniques, and procedures that has progressed from a wargame environment through structured experiments into doctrine and exercises. This progression allows us to keep the good, eliminate the bad, and make refinements throughout the continuum depicted in Figure 4.

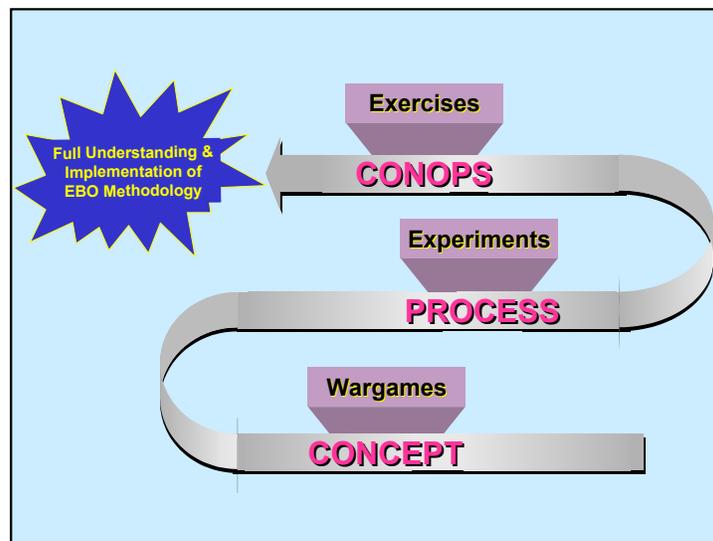


Figure 4: EBO Development and Progression.

5.0 ANALYSIS OF EBO

The analysis of EBO is not as straightforward, clean, or quantitative as attrition-based analysis [19]. When the objective is to change the decisions, actions, and behavior of other actors through coercive means, measures will be primarily systemic, psychological, and sociological rather than physical [20]. In a recent MORS workshop, a working group chaired by Air Force Wargaming and Experimentation Division (AF/XOCW) was tasked to examine how EBO could be characterized in wargaming, experimentation, and exercises. To satisfy their tasking, the group concentrated on the following four questions:

- 1) How are Effects-Based Operations currently analyzed and/or characterized in wargames, experiments, and exercises?
- 2) What are the indicators of success for Effects-Based Operations in wargames, experiments, and exercises?
- 3) What tools and techniques are available to analyze and measure the indicators of success and do any shortfalls exist in this set of tools and techniques?
- 4) What can be done to improve the analysis of Effects-Based Operations?

5.1 How are Effects-Based Operations Currently Analyzed and/or Characterized in Wargames, Experiments and Exercises?

Figure 5 reflects the discussion areas relating to the first question the working group considered.

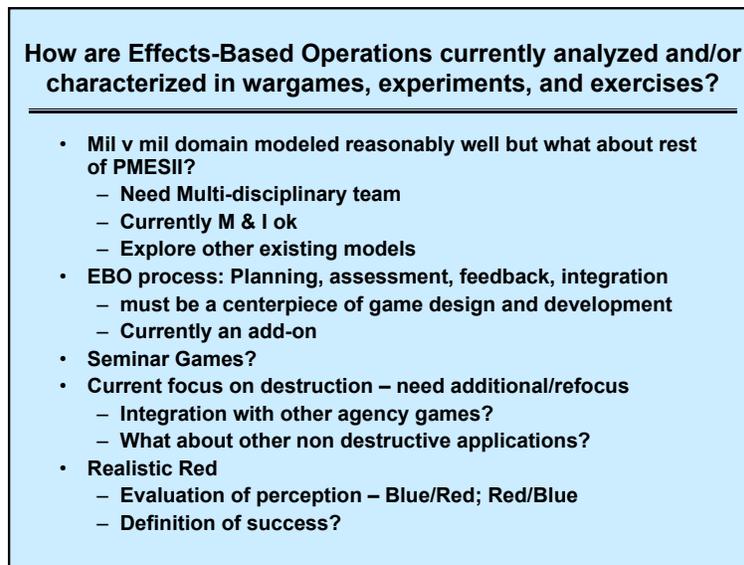


Figure 5: Current Analysis and Portrayal of EBO.

Currently, we characterize and analyze military operations and the force-on-force (attrition-based action) domain fairly well in wargames, experiments, and exercises. However, when we move outside of the military only realm and attempt to consider relationships between the Diplomatic, Information, Military, and Economic instruments of national power, our characterizations and analysis fall short. The deficiency is

more pronounced when we attempt to consider Political, Military, Economic, Social, Infrastructure, and Information (PMESII) relationships and interactions. Although we do military and infrastructure (M & I) fairly well, we need to explore other existing models and embrace a multi-disciplinary approach.

At the present time, EBO is incorporated into our wargames, experiments, and exercises as an add-on. Our efforts, for the most part, are limited to smart people trying to impose an EBO framework on wargames, experiments, and exercises. While improving, we need a more systematic approach and more integration. We need an EBO mindset integrated into the game planning process that frames intent in effects terms. With intent and guidance expressed as effects, Commander's Critical Information Requirements (CCIR) and Intelligence, Surveillance, Reconnaissance (ISR) plans could be developed to produce the metrics required to evaluate effects. As we systematically and consistently include EBO in our wargames and experiments, we must explore the tools required to assist assessment and to evaluate effects so they can be fed back to the participants.

Synthesis is the fundamental concept for EBO and may lead us to using seminar games to address parts and pieces other than the military actions of a game until we find simulations and models for non-military interactions. Preceding military focused wargames with seminar games that address effects planning and contributions of non-military instruments could be very beneficial to all wargame participants.

In our wargames, experiments, and exercises we currently focus on destruction to the exclusion of other tools. To fully embrace EBO, we may need to refocus our efforts or add parts and pieces to fill in the missing models – one that do PMESII well. The single focus on destruction leads to three problems. First, how do we integrate our military focused wargames, experiments, and exercises with other non-military games? Second, how do we consider, incorporate, and assess other non-destructive applications? Finally, how do we present PMESII to decision-makers? These problems are compounded because wargames compress a long time frame into a short period of play and it's hard to capture effects over that short time span. Depending on game objectives, the solution to our problems could be to restructure the venues as well as adding new models.

Another part of our current wargame, experiments, and exercises structure requiring change is our portrayal of the adversary. We must address demographics, cultural, economic, societal, and historical considerations for any adversary we use. We also have to provide the information for participants to get into the head of the adversary which means an in-depth description of the psychology of the enemy leader. The leadership description and other key adversary determinants must be included in game descriptors.

Operational Net Assessment (ONA) will be a key process for both blue and red. ONA is the tool to inform both sides and should form the foundation of their plans. We need to do the up front work to change EBO from merely interesting to compelling.

5.2 What are the Indicators of Success for Effects-Based Operations in Wargames, Experiments, and Exercises?

The primary indicator of success for EBO in wargames, experiments, and exercises is the same as it is in the real world – a change in adversary behavior. Although the primary indicator of success is the same in our artificial environment as it is in the real world, as Figure 6 shows, there are also measurement differences. In our created environments you can freeze the game and examine the causes for an opponent's actions and you can observe the set of behaviors in more detail. In addition, non-military interactions alter with different levels of play. Once hostilities commence, there is little, if any, consideration other than military interactions.

In the real world environment, the tools (DIME) would be cumulative or additive rather than exclusionary. In the wargaming, experimentation, and exercise environment we have better insight into the opponent's plan and perspective as well as the friendly forces commander's perception of the opponent's perspective. In the game, we can ask the respective participant what they were thinking or what they perceived the opponent was thinking.

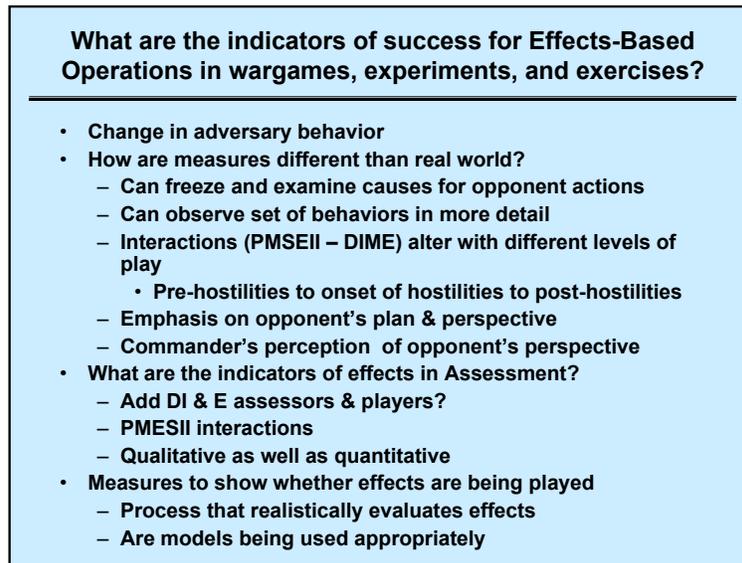


Figure 6: Indicators of Success.

Assessing effects in wargames, experiments, and exercises is an area requiring attention and further study. To start correcting this problem, we should add assessors and players with a diplomatic, information, and economic focus to our wargames, experiments, and exercises. We also need to pay special attention to PMSEII interactions and preplan both qualitative and quantitative measures of effectiveness.

The main shortfall appears to be in measures that show whether effects are being planned, incorporated, and played in wargames, experiments, and exercises. Again, this is an area that requires more attention and study to find a process that realistically evaluates effects and determines whether models are being used appropriately. As part of the solution to this shortfall, we also need a mechanism for continuously evaluating effects and providing feedback to decision makers on both intended and unintended effects. Was what you planned used? Did what you planned work? Why or why not?

5.3 What Tools and Techniques are Available to Analyze and Measure the Indicators of Success and do any Shortfalls Exist in this Set of Tools and Techniques?

The models and tools, in various stages of development and sophistication, shown under the first bullet in Figure 7 were examined during the workshop. Some of these models and tools have already been used in wargames and experiments with varying degrees of success and acceptance. Several show great promise for further development and incorporation. The bottom line is that both quantitative and qualitative models and tools are being developed to meet the need.

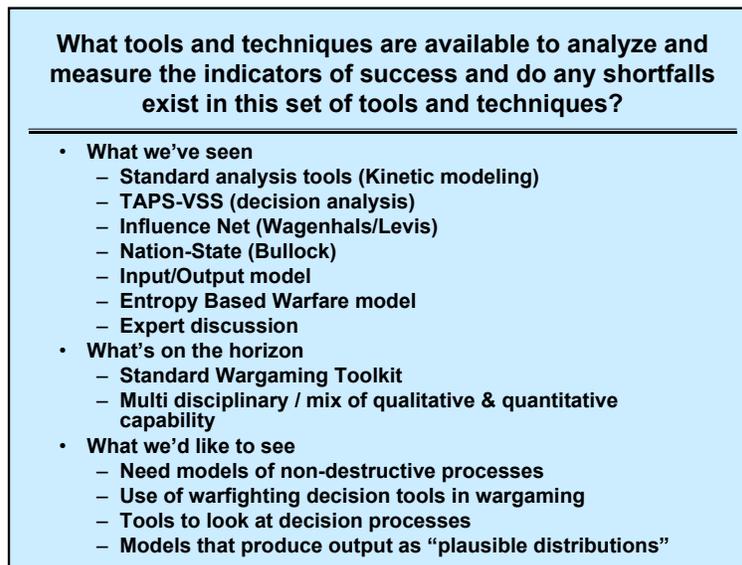


Figure 7: Tools, Techniques and Shortfalls.

Introduction of the Standard Wargaming Toolkit will provide a forum for presenting and evaluating tools for better integrating and representing EBO in wargames, experiments, and exercises. These too must include a mixture of quantitative and qualitative tools representing a multi-disciplinary approach.

The remaining shortfalls include models that accurately portray non-destructive events such as maneuver, Information Warfare (IW), and diplomatic or economic actions, which are required for the multi-disciplinary approach.

In addition, we'd like to see the use of warfighting decision tools in wargaming as well as the development of decision support tools for real world command centers and their integration into wargaming and experimentation events.

We also need decision process tools and models that produce ranges of solutions rather than point solutions. This would be conducive to giving leaders a range of options rather than "the answer."

5.4 What Can Be Done to Improve the Analysis of Effects-Based Operations?

The near term solutions in Figure 8 (definitions, lexicon, and measures) are among the areas currently under discussion at JFCOM. You can't build the analytic components and have them accepted in the community without common, understood definitions; a common and accepted lexicon; and understood and accepted measures.

- What can be done to improve the analysis of Effects-Based Operations?**
- **Near Term**
 - **Process**
 - **Definition**
 - **Lexicon**
 - **Measures**
 - **Then you can build right analytic components**
 - **Long Range**
 - **Capture ambiguities**
 - **Develop capabilities to analyze these for traceability**
 - **DOTMLPF**
 - **Capstone Joint Doctrine**
 - **Joint Effects Board**
 - **Blue's Red Cell on Commander's staff**
 - **JTF / SJFHQ organization and process**
 - **Educate & Train to EBO thought processes**
 - **Leadership development**
 - **Exercises**
 - **Senior mentors**

Figure 8: Recommendations.

The lack of standard definitions, a common lexicon, accepted measures, and understanding of the EBO process hamper progression toward a fully developed CONOPS and implementation of EBO. Because of their focus on training, EBO is not ready to be played in exercises but it must be explored in wargames and moved into and through experiments in a systematic manner with alacrity.

Long term solutions need to be able to capture the ambiguities of effects. Multiple actions can produce a single effect and multiple effects can produce a single action. Additionally, the same action may produce conflicting and contradictory effects. The other long term solution we need is the capability to analyze the causal links by tracing effects back to actions.

The requirement to anticipate, execute, assess, and adapt rapidly to create effects that will achieve national policy goals has significant implications for doctrine, organization, training, materiel, leadership and education, people, and facilities (DOTMLPF) [21]. While all areas are affected, major process improvements probably lie in doctrine, organization, training and in developing leaders with an EBO mindset.

EBO envisions extensive use of existing and anticipated information gathering and processing technologies. Vast amounts of information gathered from a host of sources with varying degrees of technical competence will need to be processed electronically into decision-level-quality knowledge for the commander's use. Military staffs integrated with non-military representation will be required to apply this knowledge with an effects-based mindset as they move through the planning, executing, assessment, and adaptation cycle. This will require new doctrine, tactics, techniques, and procedures and organizational changes [22], some of which are shown in Figure 8.

EBO methodology has important training implications as well. The need to rapidly cycle through anticipatory assessment, planning, execution and effects analysis means Joint Task Force and Component Operations Center personnel, for example, must be very carefully trained for that specific role. Moreover, these personnel must be able to understand the integration of the various roles within the component or functional operations center. To work effectively they must be trained in system (facilities, equipment, and linkages) capabilities

and limitations, as well as EBO methodology, prior to experiments, exercises and wargames and real world operations [23].

Implementing EBO methodology will require learning a new mindset from the ground up. Certainly, commanders and planners should be the experts in military art and science. Expertise will have to cross multiple domains, however: military art and science plus politics, socio-economics, culture, finance, psychology, physical science, and diplomacy, to name a few. While the primary focus must remain on military art and science, they will also need to know at least enough about each of the other domains to reach into the various disciplines, find the necessary facts and knowledge, and apply them to actions that will create the desired effects. The military will have grow the right kind of specific and general expertise in future leaders from the moment they enter service through the time they become operational planners until they are ready to be component commanders, joint force commanders and commanders in chief. To consistently instill such a mindset in everyone, all professional military and continuing education must incorporate EBO methodology [24].

6.0 SUMMARY

Although we have addressed EBO from a military perspective (our frame of reference), EBO as a methodology or way of doing business could be as applicable to corporations or non-military organizations as it is to the military. Any organization that depends on, and engages in planning of any kind (near term, contingency, strategic, etc.) could benefit from implementing the EBO methodology.

Commanders, corporate leaders, agency heads, and planners at all levels can apply the EBO methodology to all operations. For the military, this application ranges from peacetime engagement, planning for conflict or contingencies, military operations other than war, smaller scale contingencies all the way up to major theater war. Regardless of who employs the EBO, they must think in an effects-based fashion and follow the disciplined EBO methodology of predictive analysis, course of action development, planning, execution, and effects assessment, while adapting their actions and operations to changes in the environment. Above all, commanders, leaders, decision makers, and planners need to consider the effects to be achieved, the consequences of their actions and the means necessary to assess the efficacy of their actions [25].

7.0 REFERENCES

7.1 Notes

- [1] Military Operations Research Society Workshop on Analyzing Effects-Based Operations, 29-31 January 2002, Booz Allen Hamilton, McLean, Virginia.
- [2] Paul K. Davis, “Effects-Based Operations (EBO): A Grand Challenge for the Analytical Community”, Paper presented at the Military Operations Research Society Workshop on Analyzing Effects-Based Operations, McLean, Virginia, 29-31 January 2002, http://www.mors.org/meetings/ebo/ebo_pres/Davis_files/, slide 4.
- [3] Military Operations Research Society, “Workshop on Analyzing Effects-Based Operations Terms of Reference”, http://www.mors.org/meetings/ebo/ebo_tor/.
- [4] College of Aerospace Doctrine, Research, and Education (CADRE), Effects-Based Joint Operations, Draft USAF White Paper, (Maxwell AFB, AL: Air University, August 2001).

- [5] USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, White Paper Version 1.0, (Suffolk, VA: JFCOM, 18 October 2001), ii.
- [6] Ibid.
- [7] Graham Kessler, “Effects-based Operations”, Briefing presented at the Military Operations Research Society Workshop on Analyzing Effects-Based Operations, McLean, Virginia, 29-31 January 2002, http://www.mors.org/meetings/ebo/ebo_pres/Kessler_files/, slide 5.
- [8] CADRE, Effects-Based Joint Operations, iii.
- [9] Tom Erhard, Lt Col., “Effects-Based Operations: Change in the Nature of Warfare”, A briefing presented on behalf of Brig Gen David A. Deptula, slide 22.
- [10] Ibid., slide 23.
- [11] Institute for Defense Analysis/Joint Advanced Warfighting Program, “New Perspectives on Effects-Based Operations”, Draft annotated briefing, (n.p. 22 Mar 2001), 23, 26-27.
- [12] Department of Defense, Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, (n.p. 12 April 2001 as amended through 15 October 2001), <http://www.dtic.mil/doctrine/jel/doddict>, 465.
- [13] Merriam-Webster’s Collegiate Dictionary, Merriam-Webster OnLine, <http://www.m-w.com/cgi-bin/dictionary>.
- [14] Department of Defense, Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, 155.
- [15] Bruce Rolfsen, “Effects-based Operations is New Way to Fight”, Air Force Times, 7 May 2001, 27.
- [16] USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, 34.
- [17] Ibid.
- [18] Ibid.
- [19] Military Operations Research Society, “Workshop on Analyzing Effects-Based Operations Terms of Reference”, http://www.mors.org/meetings/ebo/ebo_tor/.
- [20] CADRE, Effects-Based Joint Operations, 12.
- [21] Ibid., 14.
- [22] USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, Appendix A, 1.
- [23] CADRE, Effects-Based Joint Operations, 17.

[24] Ibid., 16-17.

[25] Ibid., 11.

7.2 Selected Bibliography

College of Aerospace Doctrine, Research, and Education (CADRE), Effects-Based Joint Operations, Draft USAF White Paper, Maxwell AFB, AL: Air University, August 2001.

Davis, Paul K., “Effects-Based Operations (EBO): A Grand Challenge for the Analytical Community”, Paper presented at the Military Operations Research Society Workshop on Analyzing Effects-Based Operations, McLean, Virginia, 29-31 January 2002.

Department of Defense, Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, 12 April 2001 as amended through 15 October 2001.

Deptula, David A. Brig Gen, Effects-Based Operations: Change in the Nature of Warfare, Arlington, Virginia, Aerospace Education Foundation, February 2001.

Erhard, Tom, Lt Col., “Effects-Based Operations: Change in the Nature of Warfare”, A briefing presented on behalf of Brig Gen David A. Deptula.

Institute for Defense Analysis/Joint Advanced Warfighting Program, “New Perspectives on Effects-Based Operations”, Draft annotated briefing, 22 Mar 2001.

Jamieson, Perry D., “Lucrative Targets The U.S. Air Force in the Kuwaiti Theater of Operations”, Washington D.C., Air Force History and Museums Program, United States Air Force, 2001.

Kessler, Graham, “Effects-based Operations”, Briefing presented at the Military Operations Research Society Workshop on Analyzing Effects-Based Operations, McLean, Virginia, 29-31 January 2002.

Mann, Edward C. III, Thunder and Lightning Desert Storm and the Airpower Debates, Maxwell AFB, Alabama, Air University Press, April 1995.

Military Operations Research Society, “Workshop on Analyzing Effects-Based Operations Terms of Reference”, http://www.mors.org/meetings/ebo/ebo_tor/.

Merriam-Webster’s Collegiate Dictionary, Merriam-Webster OnLine, <http://www.m-w.com/cgi-bin/dictionary>.

Reynolds, Richard T., Heart of the Storm The Genesis of the Air Campaign against Iraq, Maxwell AFB, Alabama, Air University Press, January 1995.

Rolfson, Bruce, “Effects-based Operations is New Way to Fight”, Air Force Times, 7 May 2001.

USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, White Paper Version 1.0, Suffolk, VA: JFCOM, 18 October 2001.

USJFCOM J9 Concepts Department, Effects-Based Planning Tactics, Techniques, and Procedures (Final Draft), Suffolk, VA: JFCOM, 27 September 2001.

USJFCOM J9 Concepts Department, Effects Assessment: Joint Tactics, Techniques, and Procedures (Draft), Suffolk, VA: JFCOM, 16 November 2001.

8.0 LIST OF ACRONYMS

ACC	Air Combat Command
AF	Air Force
CCIR	Commander’s Critical Information Requirement
COA	Course Of Action
CONOPS	Concept Of Operations
DIME	Diplomatic, Information, Military, Economic
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, People, Facilities
EBO	Effects-Based Operations
ISR	Intelligence, Surveillance, Reconnaissance
IW	Information Warfare
LOE	Limited Objective Experiment
M & I	Military and Infrastructure
MORS	Military Operations Research Society
ONA	Operational Net Assessment
PMESII	Political, Military, Economic, Social, Infrastructure, Information
USAF	United States Air Force
USJFCOM	United States Joint Forces Command

AUTHOR BIOGRAPHY

Lt Col Ted T. Uchida is Chief, Joint Wargaming Support Branch, Director Command and Control, Deputy Chief of Staff, Air and Space Operations, Headquarters United States Air Force.

Col Uchida was born in Toppenish, Washington on 30 July 1962. He attended Wapato High School, graduating in 1980. After graduation, he attended Washington State University where he enrolled in the Air Force Reserve Officer Training Corps program. In May 1984, Col Uchida graduated with a Bachelor of Science Degree in Computer Science and was commissioned an Officer in the United States Air Force.

In November 1984, Col Uchida was assigned to Mather Air Force Base as a student in Undergraduate Navigator Training. After graduating in July 1985, he went on to Electronic Warfare Officer Training, where he was a Distinguished Graduate in January 1986. Col Uchida began his career as an F-111 Weapon Systems Officer at Mountain Home Air Force Base.

Col Uchida's various F-111 assignments include Assistant Flight Commander and Chief of the Tactics Branch, 20th Tactical Fighter Wing, Royal Air Force Station, Upper Heyford, England; Chief of the Weapons Division, Wing Tactical Deception Officer, Chief of Radar Strike, Flight Commander and Deputy Director, Wing Quality Center, 27th Fighter Wing, Cannon Air Force Base, New Mexico. In June 1996, Col Uchida was assigned as a student, Army Command and General Staff College and School of Advanced Military Studies. Following this assignment he was assigned to Combined Force Command, United States Forces Korea, Republic of Korea as a Combined and Joint Operations Plans Officer, Assistant Chief of Staff, CJ3. Col Uchida assumed his current duty as Chief, Joint Wargaming Support Branch, Deputy Chief of Staff Air and Space Operations on 24 July 2000.

Col Uchida is a graduate of the United States Air Force Weapons Instructor Course, Squadron Officer School, Army Command and General Staff College, and Army School of Advanced Military Studies. He holds a Master of Business Administration from Eastern New Mexico University and Master of Military Arts and Science from Army Command and General Staff College. His awards and decorations include the Defense Meritorious Service Medal, Air Force Meritorious Service Medal, Air Medal, Air Force Commendation Medal, Aerial Achievement Medal, Defense Achievement Medal, and Air Force Achievement Medal. Col Uchida is a Reserve Officer Training Corps and Undergraduate Electronic Warfare Training Course Distinguished Graduate, and Eighth Air Force Tactical Deception Officer of the Year for 1993.

He is married to the former Denise Ann Danforth.

Headquarters U.S. Air Force

Integrity - Service - Excellence

Analysis of Effects-Based Operations: The Road Ahead to Doing Business Differently



**Lt Col Ted T. Uchida
HQ USAF/ XOCW**

U.S. AIR FORCE



U.S. AIR FORCE

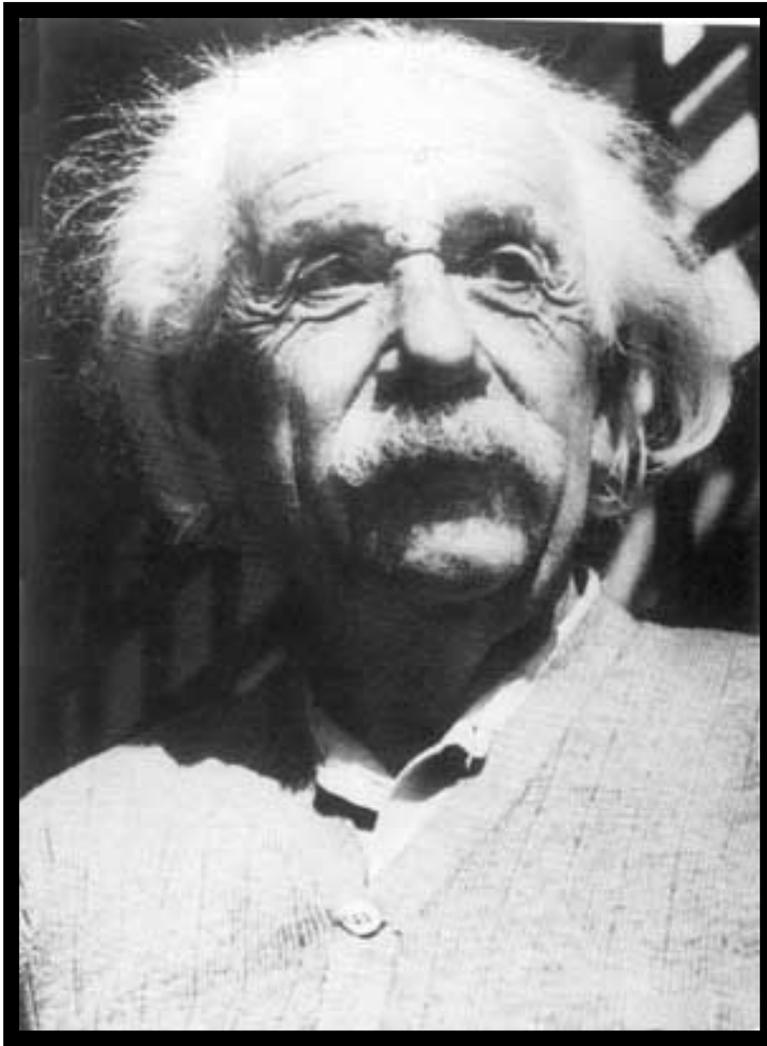
Overview

- **Introduction**
- **EBO Definition**
- **EBO Discussion**
- **Analysis of EBO**
- **Summary**



U.S. AIR FORCE

Introduction



“Not everything that counts can be counted, and not everything that can be counted counts.”



U.S. AIR FORCE

Definition

Effects-Based Operations (EBO)

A process for obtaining a desired strategic outcome or “effect” on the enemy through the synergistic and cumulative application of the full range of military and non-military capabilities at all levels of conflict.

United States Joint Force Command Concepts Department
A Concept Framework for Effects-based Operations, White Paper

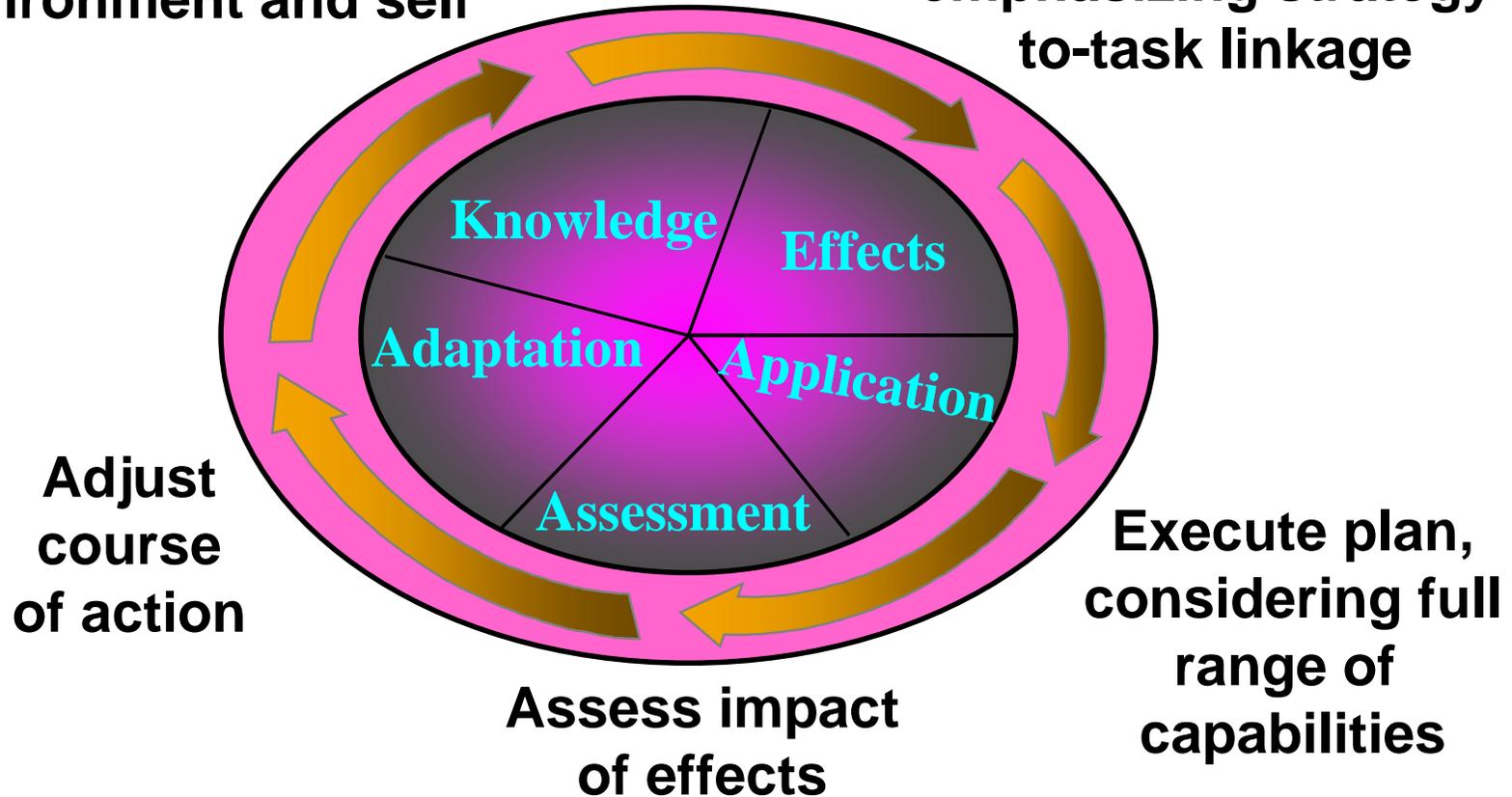


U.S. AIR FORCE

EBO As A Process

Develop comprehensive insight into adversary, environment and self

Plan for effects, emphasizing strategy-to-task linkage



Adjust course of action

Execute plan, considering full range of capabilities

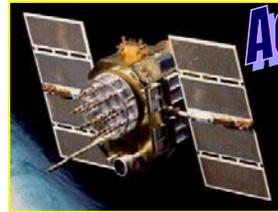
Assess impact of effects



U.S. AIR FORCE

Incorporating New Concepts & Capabilities

Effects-Based



Aerospace Forces



Concepts:

- *Rapid Aerospace Dominance*
- *Coercive Campaigns*
- *Cyber war and Perception Modification*
- *Rapid Halt*
- *Network Centric Warfare*
- *Shock & Awe*
- *Dominant Maneuver*

New Concepts & Capabilities

Capabilities:

- *Global Coverage*
- *Freedom of Access*
- *Persistent Over-watch*
- *Rapid Reaction*
- *CONUS Reachback*
- *Fewer Forces In Harms Way*

Ground Forces



Maritime Forces

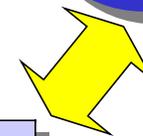
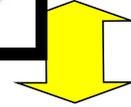




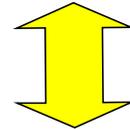
U.S. AIR FORCE

Integration of Tools and Elements

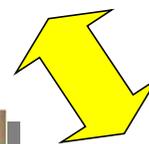
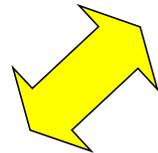
Diplomatic



**Effects-Based Operations:
Catalyst for Better Integration**



Economic



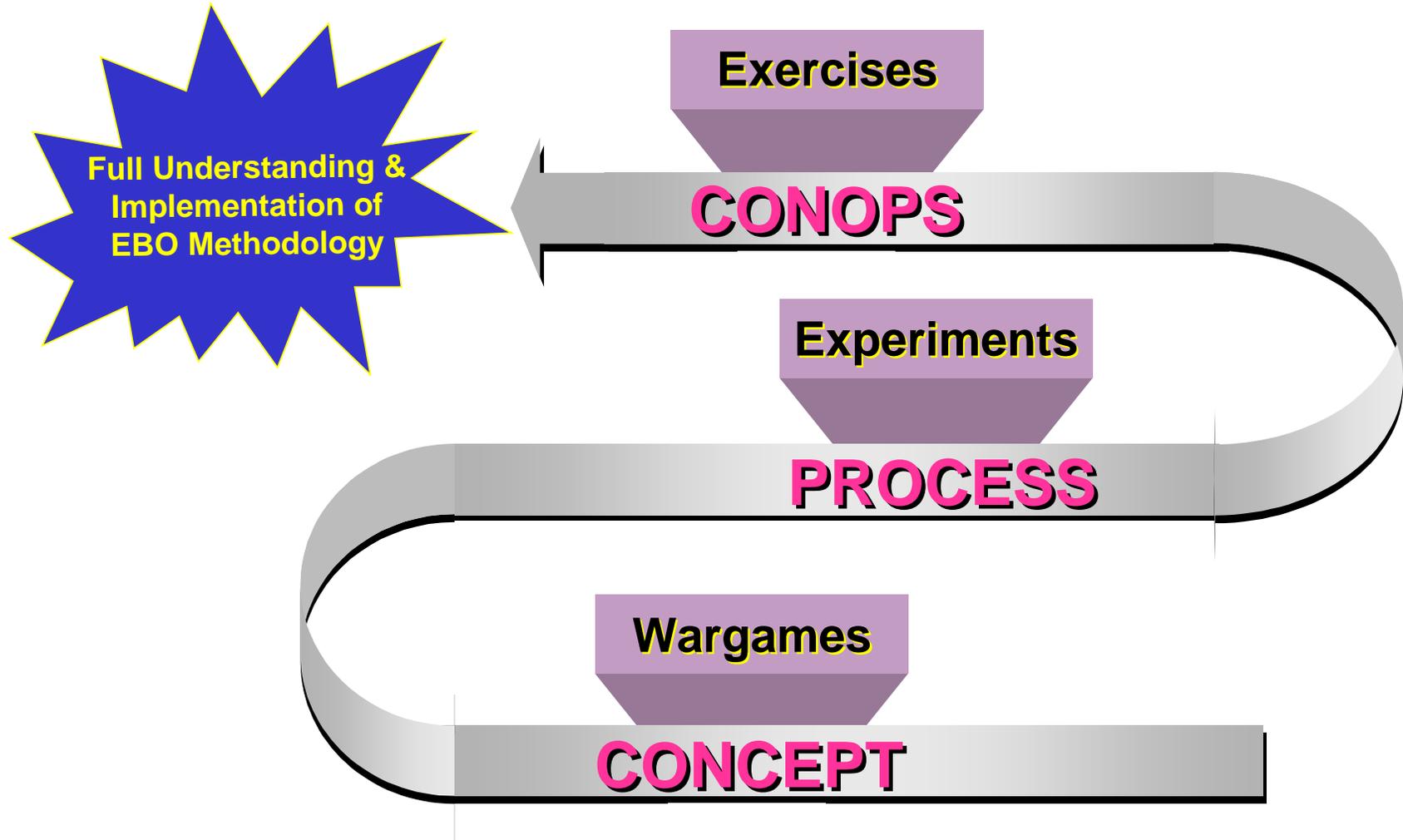
Military





U.S. AIR FORCE

EBO Development & Progression





U.S. AIR FORCE

How are Effects-Based Operations currently analyzed and/or characterized in wargames, experiments, and exercises?

- **Mil v mil domain modeled reasonably well but what about rest of Political, Military, Economic, Social, Infrastructure, Information (PMESII)?**
 - **Need Multi-disciplinary team**
 - **Currently M & I ok**
 - **Explore other existing models**
- **EBO process: Planning, assessment, feedback, integration**
 - **must be a centerpiece of game design and development**
 - **Currently an add-on**
- **Seminar Games?**
- **Current focus on destruction – need additional/refocus**
 - **Integration with other agency games?**
 - **What about other non destructive applications?**
- **Realistic Red**
 - **Evaluation of perception – Blue/Red; Red/Blue**
 - **Definition of success?**



What are the indicators of success for Effects-Based Operations in wargames, experiments, and exercises?

U.S. AIR FORCE

- **Change in adversary behavior**
- **How are measures different than real world?**
 - Can freeze and examine causes for opponent actions
 - Can observe set of behaviors in more detail
 - Interactions between Political, Military, Economic, Social, Infrastructure, Information and Diplomatic, Information, Military, Economic (PMESII – DIME) alter with different levels of play
 - Pre-hostilities to onset of hostilities to post-hostilities
 - Emphasis on opponent's plan & perspective
 - Commander's perception of opponent's perspective
- **What are the indicators of effects in Assessment?**
 - Add DI & E assessors & players?
 - PMESII interactions
 - Qualitative as well as quantitative
- **Measures to show whether effects are being played**
 - Process that realistically evaluates effects
 - Are models being used appropriately



U.S. AIR FORCE

What tools and techniques are available to analyze and measure the indicators of success and do any shortfalls exist in this set of tools and techniques?

- **What we've seen**
 - Standard analysis tools (Kinetic modeling)
 - TAPS-VSS (decision analysis)
 - Influence Net (Wagenhals/Levis)
 - Nation-State (Bullock)
 - Input/Output model
 - Entropy Based Warfare model
 - Expert discussion

- **What's on the horizon**
 - Standard Wargaming Toolkit
 - Multi disciplinary / mix of qualitative & quantitative capability

- **What we'd like to see**
 - Need models of non-destructive processes
 - Use of warfighting decision tools in wargaming
 - Tools to look at decision processes
 - Models that produce output as “plausible distributions”



U.S. AIR FORCE

What can be done to improve the analysis of Effects-Based Operations?

■ Near Term

- **Process**
 - **Definition**
 - **Lexicon**
 - **Measures**
- **Then you can build right analytic components**

■ Long Range

- **Capture ambiguities**
- **Develop capabilities to analyze these for traceability**

■ DOTMLPF

- **Capstone Joint Doctrine**
 - **Joint Effects Board**
- **Blue's Red Cell on commander's Staff**
 - **Joint Task Force / Standing Joint Force Headquarters organization and process**
- **Educate & Train to Effects-Based Operations thought processes**
- **Leadership development**
 - **Exercises**
 - **Senior Mentors**



U.S. AIR FORCE

Summary

Commanders, corporate leaders, agency heads, and planners at all levels can apply the EBO methodology to all operations. Regardless of who employs the EBO, they must think in an effects based fashion and follow the disciplined EBO methodology of predictive analysis, course of action development, planning, execution, and effects assessment, while adapting their actions and operations to changes in the environment.